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AT THE SIGN OF THE NORTHERN FLICKER.

INTRODUCTION.

The studies upon which this paper is based were conducted at National, Iowa, which is situated in the north-eastern part of Clinton county, a few miles inland and south-west from McGregor. That it is an exceptionally favorable place for the study of birds the readers of the WILSON BULLETIN know from the few short articles and notes by the author of this paper which have appeared in the BULLETIN from time to time.

If we properly interpret the particular function of the WILSON BULLETIN, this paper accurately typifies it. While there is a certain value to the detection of slight differences in the plumage of our North American birds from museum specimens, and perhaps a necessity for giving names to groups of idividuals showing the differences, it remains for the careful student of the livng birds to detect the causes for such variations. Of the two fields of study it must be clear to all that the study of the living bird in its environment is much

the more necessary. THE BULLETIN has consistently urged upon its readers the earnest pursuit of field studies, and takes this opportunity to again urge it. We *must* know more about the living bird before we can expect to assign him his proper place in the world of taxonomy as well the world of conservation in all of its aspects. Our imperfect knowledge makes any system of taxonomy admittedly tentative.

If we read this paper aright we will detect all along between the lines a devotion to the study in hand which spells an enormous amount of labor. Try it if you don't believe it!

[ED.]

The West End of the Barn in which the Flickers Nest

AT THE SIGN OF THE NORTHERN FLICKER.

BY ALTHEA R. SHERMAN.

The apartment building that displays flicker-signs all the year around is our barn. These signs consist of the holes chiseled through the siding; the marks left by the birds' muddy toes and tails, and the splashes of gastric juice which sometimes adher to the walls of the barn for a distance of two feet above and seven feet below the hole, and remain many weeks before they are washed off by the rain.

The date of the making of the first hole has not been kept, but as long ago as 1897 a pair of Flickers nested in the space into which this hole opens, a space four by fifteen by twenty-three inches formed by a board parallel to the rafters, nailed to the studding which kept the hay back from the wall of the barn. For purposes of observation it was covered with a movable board which had a peep-hole in it. In this accidentally formed cavity three years out of four Flickers raised their young, but in the spring of 1903 there came a frantic female that would not settle in the old nesting place in the east end until the pair had drilled two other holes, one in the west end, and the other in the south side of the barn. Back of each of these new holes a box was placed in the following spring, but

these proved too shallow to suit the birds for other than roosting places. Early in 1908 the first boxes were replaced by boxes made to hold one hundred cakes of that fair emblem of civilization—soap. These offer a nest room eight by twelve inches on the bottom and eighteen inches deep. In the top of each box a hole was made for observations, and a few inches from the bottom a hole large enough to withdraw the hand while it held a well-grown nestling. This hand-hole was closed by a trap-door, and the bottom of the nest was covered with excelsior, into which sawdust was firmly packed.

One male Flicker has been the subject of study for four summers. The conviction that it is the same bird each season is founded on the facts of his increasing tameness year after year, his unhesitating occupancy of the barn, and the shape of his almost circular malar stripes. On the fifteenth of April, 1908, he had taken possession of the south box, and was calling, drumming and practicing flicker-antics in the presence of a female, believed to be his mate. That he with his spacious ready furnished apartment may have proved unusually attractive to the female heart is an incident, which ought not to be too severely condemned by a race of beings among whom male creation is often courted for no superior reasons. Whatever were the underlying motives it is certain that by the twenty-fourth of the month two females were conducting an ardent competitive courtship which lasted five or six days. It was impossible to detect any new methods in their manner of wooing. There were the same struttings and spreading of feathers, the same dancing, bobbing and bowing that is practiced by the males in a similar situation.

On the evening of April 30, the rivalry having ended, a female was found roosting in the west box, two nights later the male was there. On half of the remaining nights before the first egg was laid the female roosted in the west box while the male occupied the south one. A burning question arose as to which box would be used for breeding purposes. The south one was much better located for human observations, also for

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bird comfort, it being in the shade of tall maples and a walnut tree. Both holes had been used by the birds during the courting season, and in both boxes the excelsior had been torn up and carried out, therefore the finding of an egg in the south box on the morning of May 15 was a pleasurable occasion.

From what has been related it easily may be seen that the male bird chose the nesting place, and persuaded his mate to lay her eggs there, even when she was inclined to nest elsewhere, and when she had a box quite as good as his.

The preliminaries to nesting this season differed little from those of last. Again the male suffered a dual courtship, but it lasted one day only. Three days thereafter his mate cleaned house although the sawdust was fresh and needed not to be cast out. Again there was a seeming indecision as to choice of box for nesting, and again on May 15 the first egg was laid in the south box. This made the third year when laying had commenced on that date. On other seasons the date had been a little earlier, and once a month later.

Before the eggs were laid in 1908 the male roosted part of the time in the south hole, and the female part of the time in the west hole. While the eggs were being laid, and before incubation began the male roosted in the box with the eggs. After that, incubation or the brooding of the young at night was performed mainly by the male, but on several nights the female took these tasks, and he went to lodge in the west box, where she generally, but not always, spent her nights. This nocturnal interchange of duties appears to be somewhat unusual. In 1909 the order of things was changed a trifle. The male bird began roosting in the south box on the evening of April 17, and spent every night there until that of June 23, sixty-seven nights in all. With the exception of five nights the female was a regular occupant of the west box from April 24 to June 3, after which she spent a few nights in the east hole. This desertion of her lodging place may have been caused by unwelcome visits made there by Screech Owls. For it was in this west box on April 5 that a Screech Owl was found sitting on

four fresh eggs. This nesting was ruined by a violent wind storm, yet it was believed that the owls occasionally returned to their chosen quarters.

It may be in place to say a few words regarding the popular conception of a Flicker's nest. It is usually described as "a hot, dark hole." The nest in the hollow tree cannot be vastly different from that in the barn. There it is hot when it is hot elsewhere, and it is cold when it is cold elsewhere, even when it is windy outside enough of the breeze enters to stir the feathers on the bird's back. But the worst misapprehension exists regarding the darkness in the nest. It is surprising how much light enters through a hole two and one-half inches in diameter. In the case of the south hole in our barn it lights the box sufficiently in the daytime for one to read a newspaper spread on the bottom, when the eye is at the customary distance of about twenty-two inches.

The number of eggs laid in these barn nests has been from seven to nine, with generally one to three infertile. They were deposited on the hay in the old nest, on the level surface of the sawdust in the new without any effort to hollow out a place for them. Beginning with the laying of the first egg it is the custom for one of the pair to remain in the hole as a guard for the jewel-like treasures that lie there. A lapse in this guardianship duty must have occurred some time in the day of May 16 last, for an enemy entered and destroyed the two eggs of the nest. Circumstantial evidence pointed to a pair of Red-headed Woodpeckers that in their search for a nesting-place were acting like beings possessed by an evil spirit. The next morning the distressed female Flicker flew about as if seeking a new nest. Her mate sitting in the south hole, called to her, evidently coaxing her to return to the old place, which she did.

A study of the growth of the young by weight has included the weighing and the marking of the eggs in the order in which they were laid. The usual time for depositing the eggs in the nest appears to be the hour between five and six o'clock in the

morning. The first exact data was obtained May 20, 1908, when the sixth egg was laid at five o'clock and forty-eight minutes. It was five o'clock and eighteen minutes on May 22 of this year when the sixth egg of the new series was laid, and the seventh was on the following morning at five o'clock and forty-nine minutes. The marking of this seventh egg had been postponed until four o'clock in the afternoon when a little surprise was in store. Beside it lay the eighth egg left there sometime between the hours of eleven and four o'clock. It made the identification of the seventh egg impossible so the two were marked as twins. The weight of one of these eggs was a trifle in excess of that of any of the others, and the weight of the other twin was above the average. Before six o'clock the next morning the ninth egg of the new series—the eleventh one of all—had been deposited. At this juncture a message summoned me to a distant state. My absence extended over the greater part of the time of incubation, which probably did not differ much in history from that of the nests of previous years from which I shall describe the nest activities of this period. I am greatly indebted to a friend, who in my absence visited the barn every evening and ascertained that incubation was performed by the male bird during all of the nights, while the female roosted in the west box every night except three.

By day the duties of incubation seem to be shared about equally between the two birds, who are close sitters, the eggs seldom being found alone. Of the length of the sittings no adequate record has been kept, but those lasting from one hour and a half to two hours have been noted. The bird that is returning to the nest announces its approach by a soft "wick-ah-wick" note, which the sitter answers as a rule, and at once takes its departure, flying past the mate that is hanging to the outside of the hole. It is contrary to Flicker etiquette for both of the pair to occupy the nest at the same time, and never but once have I seen one enter the hole until its mate had left. Then it was the male, who in his headlong haste, blundered in while the mother was feeding the young, and hurried her de-

parture. In the years of close study of this species I have never seen anything that suggested the feeding of one mate by the other and I doubt very much if this is done. The incoming bird enters cautiously, turns, inspects the works of creation without, hangs an instant with one foot grasping the lower edge of the hole and the other the wall below, then with a thud it drops to the bottom of the nest, but never upon the eggs. To cover the eggs the bird goes to one side of them, straddles those nearest to it, then with a hitching motion moves along until all are covered. No matter how wet and muddy it is out of doors the eggs have never been soiled.

After the nesting took place on the sawdust in the south box a new feature has been added to the routine of the nest. Before the bird covers the eggs or the young, whichever it chances to be, it eats some sawdust. The craving for sawdust seems to be limited to this period of the bird's life since no signs have been found to show that it eats any of the sawdust while it occupies the boxes before and after the nesting time. The amount eaten is considerable. That at one time the male ate three tablespoonfuls is deemed a modest estimate. An attempt to measure the amount both ate by a fresh supply daily showed the consumption of three or more handfuls. The sawdust came from sugar maple, white and red oak wood.

After the bird has arranged itself comfortably upon the eggs it goes to sleep. The female sleeps most frequently with her head turned until her bill rests among the feathers of her back. The male sometimes takes this position but not often. He sleeps with his neck flexed until his bill touches one wing, or with his head straight forward and turned down until it rests on the crown, or, the favorite position of all, with his head lying flat upon the bottom of the nest, thus making as fine a "picture of calm content as mortal ever saw."

From some former nests it had been learned that sometimes the eggs hatched in nine days, but more frequently in ten days after the laying of the last egg. On May 20, 1908, the sixth egg was seen to have been laid at five o'clock and forty-eight

minutes. Incubation began that day. On the morning of June 1, the eggs were hatching; four tiny Flickers were squirming in the nest, and as the father raised himself into a standing position one of the remaining eggs broke slowly open and another Flicker kicked itself into the world. It was a moment thrilling with interest when bird and shell were lifted from the nest, and the shell was found to bear the number six. The hour was nine o'clock and forty minutes. The exact time for incubation had been twelve days, three hours and fifty-two minutes. The seventh egg hatched four hours later making its period of incubation eleven days and eight hours nearly.

I was anxious to be beside the Flicker's box when their eggs hatched this year. Two periods for incubation had now been furnished, nine days and ten days from the date of the laying of the last egg. Therefore my return was planned for June 2. During the thirty-six hours that the iron horse bore two of us swiftly homeward, crossing and recrossing our longest rivers, and rushing over our most beautiful plains, one question kept recurring with insistent frequency: Was there danger in this case that the period might be shorter than ten days? If so, we should be too late for part of the hatching at least. When at length the Sign of the Northern Flicker had been reached, one peep into the nest revealed the facts that all nine eggs were safe, and dark with the embryos of the living birds.

The next morning being the tenth one from the date when the last egg was laid, and the eleventh from the time incubation began, a very early stand was taken beside the nesting box, but it was not until five o'clock and forty-two minutes that the occupant of egg No. 1 was sprawling in the nest. Three hours later the shells of eggs No. 2 and No. 3 were chipped, but the bird in No. 2, as well as that in No. 4, died in the shell after it had been pierced. The bird from the third egg was hatched at ten o'clock and two minutes, and the one from the fifth egg at ten o'clock and twenty-five minutes. At half-past one in the afternoon a shell that proved to be No. 6 broke open. This was the egg that was laid on May 22 at five o'clock and eighteen

minutes, hence its period of incubation had been twelve days, eight hours and twelve minutes, while that of the sixth egg of the previous year had been twelve days, three hours and fifty-two minutes. Although the shell of one of the twin eggs was chipped several hours before dark both of these eggs were hatched in the night, and the ninth or last egg at ten o'clock and forty-eight minutes on the following day, making its period of incubation eleven days and five hours, while eleven days and eight hours had been the period for the last egg of the clutch of the preceeding year. Roughly speaking, then, the time that our Flickers take for incubation is from eleven to twelve days.

The pellucid color of the newly hatched Flicker resembles that of freshly sun-burned human skin, but so translucent is the nestling's skin that immediately after a feeding one can see the line of ants that stretches down the bird's throat and remains in view two or three minutes before passing onward, This may be witnessed for several days while the skin assumes a coarser red, until it begins to thicken and become a bluish hue, before the appearance of the pin-feathers. These may be detected under the skin on the fifth day at the same time that bristle-like projections about one-sixteenth of an inch long announce the coming of the rectrices and remiges.

Until the young are about eleven days old, they lie in a circle in the nest, their long necks stretched over each other, then for nearly a week they press against the side of the nest. At seventeen or eighteen days of age, their claws having acquired a needle-like sharpness, they begin to cling to the wall of the nest, and when three weeks old they are able to climb to the hole and be fed while the parent hangs outside.

Although the eyes of the nestlings are not open until they are ten days old yet these organs are by no means dormant. An easy proof of this is made by placing the hand noiselessly over the entrance hole when they are no more than three or four days old, and are lying apparently asleep; up comes every head and they beg for food, getting none they soon sleep, when

the experiment may be repeated, gaining from the young the same response that is given when a parent darkens the hole.

That cry of the young which is so often described as a hissing sound, begins very soon after they are hatched. At first exceedingly faint it soon grows stronger and still stronger, and is uttered day and night for two weeks. A parent upon taking its place to brood these wailing nestlings begins to croon a lullaby and continues this musical murmur until it falls asleep, which often is quite soon. It has no effect in lessening the noise of the youngsters, yet the parent faithfully renders its cradle song until the young cease to make this noise which is about the time they begin to show fear. Of other cries that they make there is the chuckling noise uttered when the little one is in the act of seizing the food-bearing bill, and there is a cry that sounds like a whine. Still another one is a note of alarm given when the young are disturbed by some such thing as the opening of the trap door. This uttered in unison has a very theatrical effect strongly suggesting the chorus of the stage. After they have commenced to move about freely in the nest they make much of the time a pleasant sound like a chatter or quack, as if talking to each other. And lastly comes the grown-up Flicker "pe-ap," which they begin to call as soon as they climb to the hole. As one sits in the hole it appears the personification of juvenile impudence shouting its mandatory call. A change may be detected in the accent of this note after a feeding, when the fellow, that has received little or nothing having gained the hole, hurls after the retiring parent a yelp that sounds truly derisive.

This arrival at the entrance hole works a decided change in the young Flicker; he utters for the first time a call of his adult years, and he shows pugnacity remarkable because of its contrast with his earlier and later peaceful disposition. The versifier who wrote

> "Birds in their nest agree;
> And 'tis a shameful sight,
> When children of one family
> Fall out and chide and fight."

evidently was not familiar with the inside of a Flicker's nest, where they fight like little demons at times. Some broods are much more quarrelsome than others. Their battle-ground is in the vicinity of the hole. The one in possession of the hole maintains his supremacy there by occasional withdrawals of his head from the hole in order to deliver vigorous blows on the heads of all within his reach, causing them to shrink downward. This is the case with the stronger ones, the weaker ones frequently are driven from the vantage place. When the hole is large enough for two to thrust out their heads together, they draw within after the serving of a meal and fight furiously, while a waiting third may slip up and gain the coveted hole. But all their fighting days seeem to be confined to a few in the fourth week of their lives.

They have other occupations besides fighting during the last ten or twelve days spent in the nest. Preening themselves comes first, immediately followed by the amusement of running out their long tongues. This organ is extended the length of an inch and a half from the tip of the bill which seems extreme for such small birds. It is run over the wall of the nest, through each others feathers, or over a hand introduced into the box. The tongue is extended straight out from the bill, and the withdrawal is straight backward at times, but at other times it is whipped around almost at right angles to the bill, then disappears like a flash. They peck good-naturedly at each other and at their own toes; they hammer with the point of the bill, and of course they sleep much of the time either on the bottom of the nest or clinging to its walls. In sleep the head rests in various positions; when it is turned backward one can see exactly where the bill is placed; on these half fledged little creatures there is a naked strip between the feathers of the dorsal tract and those growing on the wing, upon this naked surface the bill rests, hence not under the wing but back of it—*parapternum*, beside the wing, describes it..

The tables of growth give the daily weights of the nestling Flickers from the time they were hatched until they left the

Young Flicker on the Day it Left the Nest

nest. In 1909 the eggs, when fresh, weighed from 106 to 111 grains, and the same eggs just before they were hatched weighed from 91 to 96 grains. The young birds freed from the shells weighed from 83 to 85 grains. The hour for hatching was reckoned from the time an egg burst open; the rest of the act of exclusion from the shell took place either in my hand or in the weighing bag, hence there was no chance for the nestling to receive food before the first weighing. The first little Flicker was not fed until it was two hours and twenty-two minutes old, then the mother inserting her bill very, very gently fed it until its weight had increased three grains.

In very early life a meal is served to baby Flicker with many insertions of the parent's bill, as many as thirty-four have been counted, but from eight to twenty are the ordinary number, decreasing to three or four before the young leave the nest. A record made during a continuous watch of six hours and thirty-two minutes shows that each parent fed five times; that the father delivered his supply with eighty-two insertions of the bill, while the mother used but forty-one. Probably the father brought more food since on every count he proved himself the more devoted parent. In grasping the bill the point of the youngster's bill is at right angles with that of the parent's, thus the opening between the food-bearing mandibles is covered after the young have attained a few days of age, and any over-dropping of food is prevented. This accident frequently happens in the early days of the nest, then the mussed up ants that fall are carefully picked up by the frugal parent when the feeding is over.

Those persons, who have watched and weighed birds from the hour of their hatching, realize what an advantage is held by the first-born. The few meals it receives in advance of the others give it a start that makes it stronger, its neck longer, and its mouth wider, so that it easily holds the lead in the race for food. This great advantage may be seen by comparing the daily gain of the oldest Flicker with that made by the others in the record for 1908, which is of nest life normal in all respects.

This record shows that the increase in the average weights is upward of one hundred grains per day for the first eleven or twelve days, after that from twenty-five to forty grains daily. All my records show that there is a period of four or five days somewhere between the thirteenth and twenty-second day when there is little increase, or sometimes a decrease in weights for a few days. Several other species, whose growth by weight has been studied, have furnished similar examples, and as this period of very slight increase, or possibly decrease in weight occurs not far from the time the nestlings begin to show fear, and their wing-feathers burst from enclosing sheaths, it is probable that three points of interest center about this period of their lives.

Although Flickers remain in the nest much longer than many of our common birds, and their rate of growth is very fast at first, yet the scales show that this growth is not proportionately very much greater than that of some other birds. Taking the following species on the ninth day of their lives we may find that the Flicker weighs twelve times as much as it did when hatched. Phoebe and Red-winged Blackbird have each increased their weight ten times, the Song Sparrow and Catbird eight times, while the Mourning Dove weighs but seven and a half times its first weight.

Numerous attempts have been made to ascertain the amount of food brought to the nest for one meal. The young were all removed from the nest except one hungry fellow that was weighed just before and after the visit of the parent. The increase in weight must have been that of the dinner just delivered. Experiments show that to a nestling weighing 143 grains was given a breakfast that weighed 76 grains, to one weighing 1430 grains a dinner of 118 grains, and to another that tipped the scales at 1530 grains a supper of 103 grains. Probably the weight of the average load is not far from one hundred grains.

The number of daily visits increases with the age of the nestling from about ten on the first day to four or five times that number later. Six or seven meals may be served within an

early hour, as many as four arriving within seventeen minutes, while at other times nearly an hour may intervene between two visits. When the young were eighteen days old during a watch of four and one-half hours twenty-five meals were given to five nestlings that wore distinguishing marks. Three of these are positively known to have received five meals apiece, and two received four apiece, if the two undetermined feedings went to the latter pair, then each one was fed at the rate of one meal every fifty-four minutes. On the following day a count was made of meals given during four hours, which numbered twenty-two. At this age the young Flickers every hour partake of food to the amount of one-sixteenth of their own weight, or in one day consume their full weight of food, yet the table of growth shows that it does not add to their weight to any noticeable extent.

In delivering the food the parents give Scripture measure, yet the young are never too full for utterance. With the food literally hanging over the edges of their bills they clamor for more until the parent leaves the hole. From this exposed food there comes a strong odor that fills the box and penetrates to the nostrils of the observer for three or four minutes after the feeding is over. The odor is not a disagreeable one, but strongly reminds us of that of a slightly over-ripe orange. It remains for the entomologist to tell us if this is the aroma of emmet jam. The filled up fledgeling slowly slips down to the bottom of the nest, there to sleep for a half hour or more; but before tranquility is restored to the nest there is a violent shaking of wings.

The subject of the cleaning of the nest would not be discussed here at length if it had not long been somewhat of a mystery to many, and if Flickers had not often been called very untidy house-keepers. The fact is they are very solicitous to keep a cleanly nest. Like many other altrical birds the Flicker eats the excrements for several days, generally for nine or ten days, then it begins to carry them out after feeding, often going out three times with the dejecta before settling down

to brood. If none of these are lying in the nest when the parent enters it begins after the feeding to solicit them. This is done by biting the heel joints sometimes, but more often the fleshy protuberance that bears that budding promise of the tail. That this nagging is no gentle measure may be judged from the way the nestling cries and tries to wriggle out of reach, for the parent is not content with three or four bites, but frequently inflicts as many as a dozen on one bird before it turns its attention to another. The victim of one parent's cleanly habit may receive the attention of the other parent in a very few minutes, and be worried until it yields a second excrement, then soon fall under the blows of the first parent again. Such triple importunities do occur, but not often. By such means the parents keep the nest scrupulously clean for three weeks.

The fecal matter is enclosed in a tough white sac that will withstand much rough handling without breaking. When the young are from fifteen to eighteen days of age the weight of these dejecta is the greatest. One of these weighed 146 grains, from a nestling of 1666 grains, another of 156 grains from a bird of 1908 grains, and another of 207 grains from a bird of 1828 grains. Statistics of this period of their lives show that each nestling is fed about once an hour, and the nest is cleaned for it once in two hours. When fledgelings begin to move about the enclosing sac is no longer formed. With the Flicker it disappears gradually; from the time they commence to climb the excrements decrease in size to about thirty grains, and one or two are dropped by each fledgling in an hour. The parents struggle heroically with the new conditions, but nature is against them. By the time the young take possession of the entrance hole they cease entering the nest at any time. But the tidiness of the parents does not extend to the ridding of the nest of the egg-shells which are rarely carried out on the day of hatching; they may lie a week before they are taken out, or are broken into tiny fragments.

Until 1909 the only menace to young Flicker life was a plague of lice. An infested English Sparrows' nest had been

routed from their nesting place shortly before a pair of Flickers settled there. They had reared a lusty brood to about their eleventh day, when the second generation of the plague, introduced by the sparrows, broke out. There were some chicken lice, but of chicken mites (Dermanyssus gallinae) there were myriads. Drastic measures were necessary: the nest was scalded with boiling water, then treated with a soap and kerosene emulsion. Daily the little Flickers were hand picked for vermin, and dusted with sulphur until the plague was abated.

This year trouble began because of three very cool days when the temperature did not rise above fifty-five degrees, and because there was a nestling twenty-nine hours younger than the eldest one. Flickers, like other birds, feed more the young that receive the food most readily. The youngster that has the widest mouth, or can suck the hardest gets the lion's share. Jostled to one side the baby of the brood soon became so weakened by the cold and the lack of food that it would fall over in its attempt to seize the parent's bill; before it could rise again perhaps the meal had been served. When it did secure the bill it was so weak it could not suck with a strong pull and was dropped by the parent in order to feed those that took the food with greater ease. From cold and starvation the baby died, aged four days.

The next morning one of the twins was passing through a similar experience. It was found very cold and straightened out in the rigor of death, but gasped a little when taken in the hand. It was carried into the house to the fire and warmed thoroughly; when returned to the nest it was too weak to hold the bill after grasping it, and fell back unnourished. Then it was that a human will rose up against what has been termed Providence, which in plainer English is often merely parental stupidity and indifference among mankind as well as among birds. Earthworms were dug, beheaded, and washed for the little starveling, for which it eagerly opened its mouth, but it could not swallow until the worm was started down its throat by means of the bent end of a wire hairpin. This was true of

the strongest of the Flickers: they made no effort to swallow until the hairpin, to the length of an inch or more, had been thrust down their throats: upon this they would suck vigorously with a loud smacking noise; but even then it was an onerous task to feed them, for earthworms, even when decapitated, are very sensitive about the order of their going, and positively refuse to back down a young Flicker's throat.

This year the young of the brood were named from the color of the cotton string each wore upon its left foot as a distinguishing mark. Very briefly the history of raising little Redfoot from death's door is this: After a long hard struggle in the feeding of the first worms it was sufficiently nourished to be returned to the nest, still it stood slight chance in the contest against the stronger ones. In this disadvantage Grayfoot, the other twin, shared; therefore the other nestlings were frequently taken from the nest and fed earthworms giving the twins opportunities to gain the whole meal. Later a better scheme was devised; by introducing a hand into the nest Redfoot was held in readiness for the return of Father Flicker, and by offering Redfoot's mouth to him first, the little one received all it could take. From extra attention through six days Redfoot made such rapid growth that it was able thereafter to hold its own, and the figures of the record show that as far as weight is a requisite it went forth into the world as well prepared as any.

On the warm, pleasant day following that of the successful resuscitation of Redfoot both twins had received extra feedings from the father, and could hold on to the bill like little leeches; after the daily weighing they were occupying the nest by themselves for a few minutes, when the mother came in. If alienists were called in to pass judgment upon what followed I am sure they would pronounce it a case of "brainstorm." Certainly it bordered on the extraordinary; probably there was a shock to the mother's nervous system caused by the absence of the rest of the brood, however it may have been she very roughly shook the twins about as they held tightly to her bill; then

she stopped feeding, solicited an excrement, obtained and ate it, after which she began feeding again—an unheard of thing to do—then with Grayfoot hanging to her bill she dashed out of the nest. Possibly she was alarmed by some noise, but I heard none. On the preceding day mistaking her arrival for that of the father I began to open the trap door whereupon she flew out like a flash. For the hapless little creature the ground in ever widening circles was searched fruitlessly during several hours, scarcely a leaf remaining unturned; if it was not killed by its fall to the earth, it perished most miserably.

The study of former Flicker nests revealed the fact that it is the male bird that shows the fearlessness and devotion that we are wont to find more prominent in the mother in most species. Until the cases of starvation in the nest of 1909 occurred great pains had been taken not to disturb the natural activities of the nest; only in taking out and returning the young at weighing time did any one so much as show a hand. At such times the father, eager to return to brooding, frequently came down and touched the hand. This year it was decided to let the hand touch him. To patting and stroking he fearlessly submitted although evidently not relishing it. He suffered the hand to poke under him in taking and returning the nestlings and finally he did not shrink from it when it held up one of the twins for him to feed. This so called tameness, which more truly is the engulfment of fear by the overwhelming instinct to brood and care for the young, gradually disappeared, and by the time the young ceased to need brooding he was as timorous as before. His timidity, however, was far less than that of any other Flicker that has been a tenant of the barn.

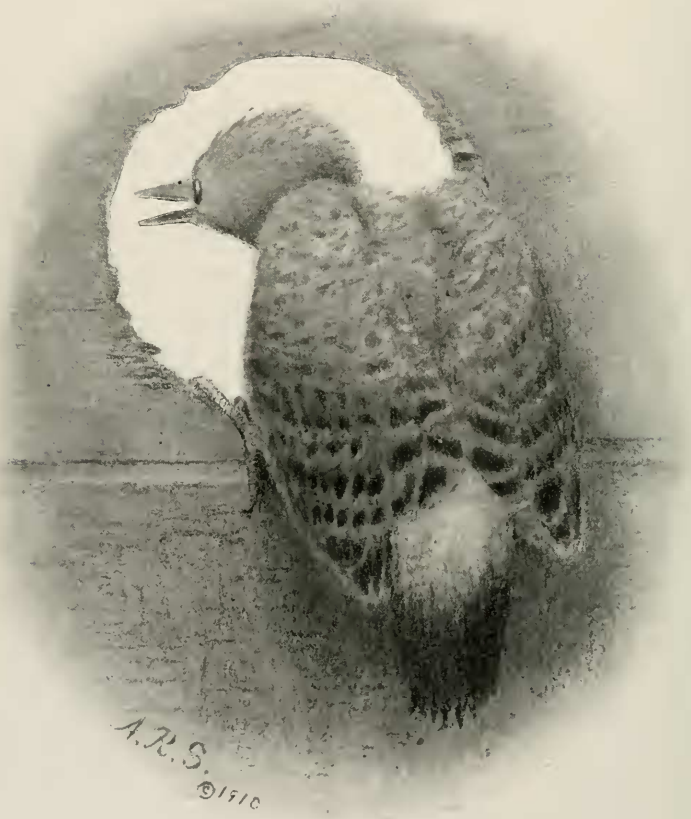
Generally the sounds that aroused fear in this species were made by some one back of their nest, yet the bird always sought the hole and looked for the cause of alarm outside. After two seasons of experience with the five-fingered terror that entered the hand-hole so often, and removed their young, they failed to learn to look for any disturbance from that direc-

tion. Another illustration similar to this is the careful inspection of the hole before entering it at night, a Screech Owl or other enemy might be lurking there, and experiences through millions of generations, have created an instinct of caution akin to that racial instinct that leads human beings to search for the hidden enemy, the man under the bed.

It has already been mentioned that this year the male Flicker covered the eggs every night; he also staid with the young every night until they were three weeks old, brooding all of them until nearly two weeks of age, when they began pressing their breasts against the side of the nest, and he could cover the tails of two or three only, after which for two or three nights he sat upon the bottom of the nest apart from the young; then for four nights he hung upon the wall of the nest near the hole; thereafter he staid with them no more. The date of this desertion is coincident with the fledgelings' attainment of the entrance hole, which is the time the parents begin to fail to keep the nest perfectly clean. The parents fed so late in the evening that it was often impossible to identify the brooding bird without the aid of a flash-light lantern; this did not disturb him and he sometimes slumbered on regardless of it.

Pronounced individual characteristics could be recognized in the fledgelings; Blackfoot and Whitefoot were over-bearing little gluttons; Pink was the pert one of the brood; Blue was a spunky little creature, the hardest biter of all; Redfoot was timid and demure, perhaps the early ordeal of cold and hunger had a sobering effect on it. As models for drawing or painting the little Flickers are the best posers of any species I have tried. They have posed for their pictures from one to two hours on occasions when there has been scarcely a movement other than the winking of their eyes.

As the eggs hatched in the order in which they were laid, so the fledgelings went forth in the order in which they were hatched; Blackfoot early in the morning of their twenty-sixth day, Whitefoot and Pink late that afternoon. The next day the father brought at least one meal to Blue and Red-



HURLING A DERISIVE YELP

foot, but most of the time they fasted. Late in the afternoon Blue flew from the nest, leaving Redfoot to spend the night alone.

The next morning Redfoot still clung to the hole, although good strong branches swung invitingly only four feet away. For two months and a half the Flickers' nest had claimed more than its share of attention. Of the twenty-five species that have been found nesting on our grounds, more than half of that number had nests there this year. Many of these were advantageous subjects for study, and were demanding attention on that morning of June 30 while the little Flicker timidly lingered. Somewhere in the tree-tops was Blue and the two answered call for call. The hand might still caress the form of the little bird as it hesitated to make the frightful plunge. Finally, at nine o'clock and eight minutes, standard time, there was a flash of feathers, light streamed through the erstwhile darkened hole, for the wilderness of green had enfolded little Redfoot.

Both Whitefoot and Blue were seen and identified on the mornings following their departure from the nest. For six days Redfoot remained in the tops of the maples; sometimes it could be heard crying for food, and sometimes a parent could be seen trying to coax it away. On the morning of July 5 both parents were seen to leave its neighborhood, and it soon flew to an old apple tree, then along a fence: this was its first excursion. Several times thereafter it was identified by means of its crimson badge. For a few weeks all was very quiet in Flicker-land. On July 22 weaning time must have been near at hand, when the parents appeared followed by three youngsters, and one begging for food was pecked a decided refusal by the mother.

On the nights of the eighth, ninth, tenth and thirteenth of August a young Flicker roosted in the old nest box. On two nights in July and two in September the father occupied the west hole. Possibly it was the unusual dryness of the summer that caused him to desert his old lodging-place. I be-

lieve him to be the timid Flicker that began roosting in the west hole in August, 1906, but soon changed to the east hole: that he came again the next summer, and before the middle of July had cleared out a boxful of trash carried in by English Sparrows, but did not begin to roost there until August 3, then, excepting a few nights, was a regular lodger until September 29. By the end of that season he had become quite fearless.

Of all our birds the Flickers are the earliest to retire at night, sometimes going to their lodgings an hour before sundown, the customary time being about a half hour before sunset. Generally they go out soon after sunrise, but on cool autumn mornings they have been known to linger much longer. During a rainstorm in the middle of the day they have been seen to seek their apartments, also in fine weather they have been found there enjoying the seclusion thus afforded. It sounds like a simple matter to say that barring about two dozen nights a certain Flicker roosted in the barn every night from April 19 to October 2, yet this ascertainment involved an examination of the holes from the outside once every evening for six months, sometimes three or four times if the visit be made too early, if too late then a loud clapping of the hands may be insufficient to wake the heavy sleeper, and a sharp blow on the barn wall or a continuous bombardment with any convenient missiles may be necessary to force the lodger to show himself. To examine the boxes from the inside too greatly disturbs the birds. Many unsuccessful attempts were made to see just where and how the Flicker roosted in the box; at last the fearless male furnished the much sought opportunity. Not far from the hole he clung to the upper edge of the siding, and slept with his head turned backward, his bill resting in his interscapulars.

In the summer of 1908 three Flickers roosted in the barn; the one in the east hole was timid, making it difficult to learn of his movements; however, it is certain that he went to roost there at least half of the nights from July 12 to September

25. The next spring a bird of corresponding behavior returned to this hole on April 12 and continued his roost there for almost a month. The bird in the south hole was a regular lodger from the seventh of August to the first of October, excepting two nights when he was frightened away. The occupant of the west hole was the father of the brood raised in the south box, where he took lodgings on April 15 and stayed there the greater part of the time until the young ceased to need his care. This box was cleaned thoroughly as soon as the young had gone out, but apparently it was regarded as the nursery, and not as a sleeping apartment by this Flicker, who returned to his old quarters in the west end on the sixth of July, preferring it to the cooler place in the east end. On some hot evenings he must have found there a temperature of one hundred degrees, the thermometer having shown a mark nine degrees higher two hours earlier. Before July 20 he had failed to come in on four nights, after that he came every night until that of October 2. He was there as usual on the evening of the first of October, whether he began his southward journey at some time in the night or at an earlier hour than he was accustomed to go out, no one can tell. He wore no tag, therefore gave no one a pretext for killing him; he returned in safety the following spring, and this, it is hoped, he may continue to do for many years to come.

FLICKERS IN 1910.

Some points of interest in the summer life of the Flicker, omitted from the preceding paper, together with a resume of the history of this species for 1910, are given in the following pages.

In this portion of northern Iowa the young Flickers meet with few destructive enemies and a goodly number go southward every autumn, yet there appears slight, if any increase, in their numbers when they return in the spring. To each of the old nest sites there returns a pair; these nests in my immediate neighborhood are about a quarter of a mile apart:

outside of the villages every farm-yard, that has suitable trees, usually furnish a home for a pair, but as there are only two or three farms upon a section of land the houses average about a half mile apart. In placing themselves for the summer how large a space does a pair demand?

To provide more roosting places, also to see if more than one pair of Flickers could be induced to nest on our grounds the nest-boxes in the barn have been increased from three to seven. Three springs ago a suitable box was nailed upon a willow tree that stands about twenty-five rods from the barn, and the following spring another was placed in my bird-blind, which is situated near the willow tree. When the Flickers returned in 1910 the last mentioned boxes were occupied by a nesting Screech Owl and her mate, thus once more reducing accommodations to the boxes in the barn, where, as hitherto, but one pair nested.

One determining factor, perhaps the principal one, in the spacing of their homes may be the area necessary for their food collection. The places they usually frequent for food are pasture lands and newly mown fields. With binoculars I have followed the flight of a parent Flicker to the barn from a pasture nearly a half mile distant, while far too many ant-hills existed near at hand. This choice of open and closely cropped fields for feeding may be the chief influence that leads them to seek prairie homes, although thousands of wooded acres stretch along the Mississippi River, their western border being but two miles to the east of us. Besides our barn the only known buildings in the neighborhood inhabited by this species are an ice house, used for nesting, upon a farm three miles distant, and the amphitheater on the county fair grounds, used for roosting, a quarter of a mile away.

The advent of the first Flicker in 1908 was on March 26: for the following spring it was on April 4, while this year it occurred on March 23, and eight days later three of them went to roost in the barn. Among them the tame old male

could not be found; his last journey may have been the long one from which none return. It is hoped that he died full of years, as he certainly did full of honor. The greatness of the debt of gratitude due him was not fully realized until the timidity of his successor made it apparent. The wildness of this bird precluded the former freedom of nest study: and his offspring, either from heredity or example were wilder than any brood of previous years.

The courting in 1910 was conducted by the males, and was a very inconspicuous affair. The mother of the nest is believed to be the same as that of last year. She bore no distinguishing marks, but her familiarity with the place and the readiness with which she took up her roosting quarters in the old west box pointed to this conclusion. The four new boxes had been placed in the southwest corner of the barn, occupying a space that might have been enclosed in a tree two and one-half feet in diameter. The entrances to two of the boxes were on the south side and the others on the west. In the lower box upon the south side roosted the male before the eggs were laid. As has been related the tame old male of recent years was a masterful fellow and rather insisted that the laying should be done in his box. This year the eggs were deposited in the box of neither parent, but in the lower one of the new boxes opening toward the west—a box in which there had been made no demonstrations of choice before the laying began. Here the male at once took up his abode and later performed the usual duties of incubation and brooding.

The first egg was deposited on May 5, a date ten days earlier than that of any year except 1906. On the morning of May 9 the hour of deposition of the fifth egg was six o'clock and ten minutes, that of the sixth egg was five o'clock and fifty-four minutes on May 10, and of the seventh was five o'clock and forty minutes on the following morning. The morning the eighth egg was laid the mother went to sleep several times upon her nest, then sat outside the nest upon a

perch; thinking that the clutch had been completed the watch was discontinued a few minutes after six o'clock. The next morning the nest was not visited until a late hour, hence it was not due to any known disquietude that the female neglected her own nest and laid her ninth egg in the box above, having its entrance fourteen inches to the right and above her nest: there the egg was allowed to remain for nearly a month, when it was probably eaten by one of the pair.

Five of the eggs hatched upon May 22, making a period of nine days from the laying of the last egg, a shorter period than that of any previous nest except that of 1905. Since incubation of a somewhat inconstant nature begins upon the day the sixth egg is laid it was a bit of good fortune that it was the female, instead of the timorous, complaining male, that was at home when the sixth egg broke open at two o'clock and eight minutes in the afternoon of May 22, making its period of incubation twelve days, eight hours and fourteen miuntes, which was exactly two minutes longer than the incubation period for the sixth egg in 1909. The order of the hatching was irregular, the second egg being the fourth to hatch and the first one last.

The number of young reared in these barn nests has invariably been five or six. None died in the nest until 1909, infertile eggs reducing their number to the above figures. This year the last two Flickers hatched, lively little fellows, that struggled hard for food, but apparently received none, died from starvation at the end of their second day. That the father was a poor forager is attested by the daily average of weights of the brood, which, during the latter portion of their nest-life, was lower than any previous records; nevertheless the young began to leave the nest when twenty-five days old, which is earlier than some broods leave. The smallest nestling lingered two days longer; its stay might have been of still greater length if unintentionally it had not been frightened out of the nest about noon of June 18.

Some seasons the parents take their young away from the neighborhood as soon as possible, but in others, as was the case this year, they remain constantly about the place for several weeks until the family ties are loosened. These ties do not appear to be entirely broken during the rest of the summer, there being times when apparently the whole family has a joyful gathering on the roof of the barn, or in the top of a dead willow tree. Again just before their hour for going to roost four or five of them, having found a luxurious bed of dust, disport themselves therein with evidently as keen enjoyment as a duck finds in water. Flickers, like other members of the Woodpecker family, have little use for water. During many hours, all of which taken together would amount to weeks I have watched from a blind a pool of water much frequented by the birds for drinking and bathing purposes. Near it stands the dead willow visited daily by Red-headed Woodpeckers and Flickers; there the former have never been seen to drink, and the latter on two occasions only. The first time it was the tame old male that backed down a fence post to the surface of the water and drank while clinging to the post.

Aside from occasional rather curious exhibitions of courtship the late summer interests in the Flicker center about his food habits, his moult, and his roosting. All seven boxes in the barn have been used for roosting purposes this year, only five, however, at one time. For the first time a female has had a chance to occupy a box after the nesting season was over: formerly she was driven out by the males. In its summer roosts the Flicker is one of the most immaculate of lodgers. When he leaves for the south after several months of occupancy of a box no droppings of any kind can be found there except some of his moulted feathers, remaining as little tokens of the excellent bird that spends just half of the year as a sharer of our home. But in the nesting boxes some signs of the Flicker's inhabitancy are permanent: these are the places hewed by their chiseling bills. In the last box

used this was very slight, in the south box where they nested for two seasons a hole as large as a half dollar was made through the half inch boards, which would have formed an opening into the barn if it had not been for the batten back of it. It is in the old east hole occupied for so many years that this hacking is most prominent. Below the entrance hole the siding of the barn in places has been hollowed out to half its original thickness, and the board parallel to the rafters, that helped form the cavity, has been cut half way through in that portion of it that is opposite the hole. Evidently this was done to enlarge the space; the other cuttings probably are the result of the bird's natural tendency to enlarge its nesting chamber while sitting, or it may originate from the bird's habit of hammering with its bill at such times. This hammering, which is often heard before the eggs are laid, seems to be a call, and when done while the bird is incubating it may be for the same purpose, since it appears to be indulged in toward the close of a long sitting, when the bird shows signs of restlessness by frequently going to the hole to look out.

Flickers from the Brood of 1903

Weights of Flickers
Brood of 1908

Egg		No. 1	No. 2	No. 4	No. 5	No. 6	No. 7	Aggregate weight of brood	Average daily weight
weight of egg-fresh		GRAINS 98	GRAINS 106	GRAINS 106	GRAINS 109	GRAINS 107	GRAINS — —		
weight of egg-hatching			95	98	101		100		
					JUST HATCHED				
1st to 28th day in life of the Flickers	1	89	89	89	85	84	84		
	2	171	159	155	154	129	120	888	148
	3	238	215	213	211	200	180	1257	209
	4	338	331	329	310	309	292	1909	318
	5	486	434	429	409	400	397	2555	425
	6	578	576	568	550	537	503	3312	552
	7	760	742	678	660	628	611	4074	679
	8	940	859	767	743	739	710	4758	793
	9	1026	911	867	850	830	825	5309	884
	10	1207	1045	1042	1008	992	901	6195	1032
	11	1427	1318	1239	1151	1116	1005	7256	1209
	12	1540	1321	1313	1218	1194	1140	7726	1287
	13	1828	1324	1303	1300	1223	1143	8121	1353
	14	1619	1506	1380	1186	1079	1006	7776	1296
	15	1715	1565	1500	1394	1315	1143	8634	1439
	16	1629	1568	1526	1515	1377	1248	8863	1477
	17	1766	1685	1657	1631	1501	1247	9487	1581
	18	1775	1670	1669	1657	1555	1506	9832	1638
	19	1767	1707	1699	1640	1550	1500	9863	1643
	20	1834	1830	1756	1565	1558	1436	9979	1663
	21	1805	1756	1730	1658	1564	1442	9955	1659
	22	1960	1944	1774	1721	1569	1540	10508	1751
	23	1821	1806	1780	1754	1686	1565	10412	1735
	24	1935	1878	1744	1701	1669	1557	10484	1747
	25	1859	1830	1829	1694	1682	1645	10539	1756
	26	1846	1825	1755	1736	1642	1581	10395	1732
	27	1679	1575	1544	1535	1503	1500	9436	1572
	28				1530	1430	1419		

Apothecaries' weight was used and for convenience all weights were kept in grains. The young of this brood were not marked, consequently their weights were placed in the order of their size.

Weights of Flickers
Brood of 1909

Egg		No. 1	No. 3	No. 5	No. 6	No. 7	No. 8	No. 9	Aggregate weight of blood	Average daily weight
weight of egg-fresh / weight of egg-hatching		grains 110 / 88	grains 108 / 95	grains 108 / 96	grains 106 / 93	grains 109 / 96	grains 111 / —	grains — / 95		
		Black-foot	White-foot	Pink	Blue	Gray-foot	Red-foot	Baby		
1st to 28th day in life of the Flickers.	1	85	85	83	84					
	2	197	173	164	156	117	116	83	1006	143
	3	286	257	244	210	193	176	113	1479	211
	4	426	370	346	332	302	296	202	2274	327
	5	428	413	405	362	354	324	230	2516	358
	6	606	516	500	422	396	314	184	2938	419
	7	666	534	489	440	404	303		2836	472
	8	855	725	643	623	554	413		3813	625
	9	1104	847	830	712		697		4190	838
	10	1260	1118	1154	1048		936		5516	1103
	11	1410	1267	1218	1210		1081		6186	1237
	12	1604	1330	1297	1286		1208		6725	1345
	13	1647	1590	1540	1410		1352		7539	1507
	14	1680	1602	1594	1436		1511		7823	1564
	15	1855	1790	1782	1634		1666		8727	1745
	16	1882	1832	1834	1574		1730		8852	1770
	17	1958	1966	1765	1635		1635		8949	1789
	18	1964	1990	1837	1746		1731		9178	1835
	19	1929	2105	1867	1732		1783		9416	1883
	20	2100	2016	1968	1808		1902		9794	1958
	21	2012	1966	1824	1698		1855		9355	1871
	22	2115	2037	1920	1866		1969		9907	1981
	23	2150	2079	1954	1806		1871		9860	1972
	24	1980	1920	1858	1846		1954		9558	1911
	25	1950	1975	1869	1788		1900		9482	1896
	26		1990	1794	1823		1745			
	27				1640		1811			
	28						LEFT NEST			

The egg of the twins here marked No. 7 hatched first, hence thought to be the earlier egg. Red-foot left the nest before it was weighed on its twenty-eight day.

Weights of Flickers Brood of 1910

Weight of eggs -fresh.- No.1-97grs. No.2-104grs. No.3-109grs. No.4-113grs. No.5-112grs. No.6-113grs.								*Aggregate weight of brood*	*Average daily weight*
		GRAINS	GRAINS	GRAINS	GRAINS	GRAINS	GRAINS		
1st to 28th day in life of the Flickers	1	101	100	88					
	2	200	194	177	169	150	112	902	150
	3	295	279	270	267	175	137	1423	237
	4	418	396	375	340	275	199	2003	334
	5	525	514	488	480	400	327	2834	472
	6	686	603	579	554	505	390	3317	553
	7	796	734	719	695	637	490	4071	678
	8	871	832	795	793	647	601	4539	751
	9	968	964	945	920	748	681	5226	871
	10	1183	938	1026	1078	906	880	6011	1001
	11	1242	1227	1204	1133	976	969	6751	1125
	12	1385	1248	1241	1256	1244	1175	7549	1258
	13	1429	1271	1274	1455	1182	1140	7751	1291
	14	1531	1543	1375	1342	1173	1120	8084	1347
	15	1745	1634	1529	1495	1417	976	8796	1466
	16	1725	1568	1627	1617	1302	1148	9187	1531
	17	1595	1625	1613	1523	1519	1265	9140	1523
	18	1614	1559	1426	1581	1615	1270	9065	1510
	19	1639	1579	1535	1563	1481	1305	9102	1517
	20	1846	1656	1614	1665	1513	1396	9690	1615
	21	1800	1639	1625	1616	1440	1486	9606	1601
	22	1687	1648	1672	1565	1483	1492	9547	1591
	23	1722	1676	1665	1694	1519	1536	9812	1635
	24	1758	1685	1729	1653	1492	1479	9796	1632
	25	1725	1670	1643	1627	1571	1457	9693	1615
	26						1462		
	27						1494		
	28						LEFT NEST		

The smallest one left the nest on its twenty-eighth day while attempting to take it out for its daily weighing. The young of this brood wore distinguishing marks.